

Title: APPARATUS FOR EMPTYING RECEPTACLE

Technical Field

5 The present invention relates to an apparatus for emptying the contents of a receptacle as a controlled pouring operation. The apparatus of the present invention is particularly suitable for use in the wine and horticultural industries, and will be described with a special reference to this application. However, it will be appreciated that the apparatus of the present invention also is suitable for use in a wide variety of
10 other industries.

Background Art

At present, the transfer of selected grape material (e.g. fruit, pulp, juice or pre-drained
15 skins) from a holding tank receptacle or other fermentation vessel to a membrane press is achieved by manual evacuation or mechanical conveyance.

Manual evacuation is carried out by a person entering the vessel and digging the wet solid material toward and out of a low outwardly opening door into an open throat pump, or onto a conveyer or open auger where it is conveyed to a membrane press.
20 The main disadvantage of manual evacuation is the requirement for human labour to perform a tedious and potentially unsafe and unhygienic job. The task is time consuming and thus the overall press cycle time is increased. Further, digging, pumping and auger conveyance of wet material often decreases the quality of the final wine product given that the skins can be sheared allowing unwanted flavours to be
25 secreted from the grapes.

An alternate method of evacuation, known as the chuting method, is to mount a conical bottomed tank above a membrane press. The tank is provided with a door or large valve at or adjacent the base which when opened allows the contents to flow directly into the press. It is difficult to control the flow rate and emptying of the
30 contents, and so the chuting method is prone to over spills. The contents also tends to agglomerate such that agitation may be required. In view of the fact that the tank is mounted above the press, an extensive high catwalk structure is required for access and servicing. The conical bottom of the tank defining the internal cavity floor is also

difficult to clean.

PCT/AU 95/00009 discloses a bin unloader for picking up and inverting wheeled rubbish bins. In this device, a bin to be unloaded is wheeled into an enclosure, the upper part of the bin is gripped by gripping claws, and the bin is raised and inverted. Each bin is supported upon the floor until gripped by the gripping claws. The rate which the bin is lifted and inverted is not controlled in any way: -- the object is to dump the rubbish out of the bin quickly, rather than a controlled pouring of the rubbish.

10 Disclosure Of Invention

It is an object of the present invention to provide an apparatus for emptying a receptacle which minimizes bruising and/or spillage loss during emptying of the receptacle contents and provides rapid but controllable emptying in a manner which places relatively low stress on the material being emptied. It is a further object of the present invention to provide an apparatus which is self supporting and of a relatively compact design.

The present invention provides apparatus for emptying a receptacle, comprising:

a stationary support frame adapted to be supported upon the ground or equivalent supporting surface;

securing means for securing a receptacle to said stationary support frame, such that said receptacle is suspended in a substantially upright position clear of the ground; said securing means being pivoted to said stationary support frame;

moving means mounted between said securing means and said stationary support frame; said moving means being operable to tilt in a controlled manner a receptacle secured by said securing means between a first, substantially upright, position and a second, inclined, position.

The present invention further provides the combination of apparatus for emptying a receptacle, and a receptacle, comprising:

a stationary support frame adapted to be supported upon the ground or equivalent supporting surface, said support frame providing a framework which at least partially surrounds the receptacle;

5 securing means for securing said receptacle to said support frame, such that said receptacle is suspended in a substantially upright position clear of the ground and of said framework; said securing means including a collar which at least partially surrounds said receptacle and is secured thereto; said collar being pivoted to said support frame;

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moving means in the form of a pair of spaced hydraulic rams mounted between said collar and said support frame; said moving means being operable to move said receptacle relative to said support frame such that said receptacle may be tilted in a controlled manner between a first, substantially upright, position within said support
15 frame and a second, raised and inclined, position outside of said support frame.

The present invention also provides the combination of apparatus for emptying two receptacles, comprising:

20 a pair of opposed stationary support frames each adapted to be supported upon the ground or equivalent supporting surface, one support frame providing a framework which at least partially surrounds one of the receptacles, and the other support frame providing a framework which at least partially surrounds the other of the receptacles;

25 securing means for securing each receptacle to the corresponding support frame, such that said receptacle is suspended in a substantially upright position clear of the ground and of said corresponding framework; each said securing means including a collar which at least partially surrounds said corresponding receptacle and is secured thereto; each said collar being pivoted to said corresponding support frame;

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moving means mounted between each said collar and said corresponding support frame; each said moving means being operable to move said corresponding receptacle relative to said corresponding support frame such that said receptacle may be tilted in a controlled manner between a first, substantially upright, position within
35 said corresponding support frame and a second, raised and inclined, position outside

of said corresponding support frame; and

a gantry rigidly secured between said opposed support frames, said gantry extending horizontally just below the level of the top of said receptacles in said second position.

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The or each moving means may comprise a pair of spaced hydraulic or pneumatic rams.

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The or each receptacle may be any of a wide variety of shapes, depending upon the application of the apparatus and receptacle. The or each receptacle may have an open top, or a partially closed top, or a top formed as a pouring spout; the top may be completely closed by a removable lid or cap.

Brief Description Of The Drawings

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By way of example only, preferred embodiments of the present invention are described in detail with reference to the accompanying drawings, in which:-

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Fig. 1 is a side view of the apparatus in accordance with a first embodiment of the present invention;

Fig. 2 is an isometric view of two sets of apparatus in accordance with a variant of the first embodiment;

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Fig. 3 is a side view of the apparatus in accordance with a second embodiment of the present invention; and

Fig. 4 is a side view of the apparatus in accordance with a third embodiment of the present invention.

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Best Mode For Carrying Out The Invention

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Referring to Fig. 1, the apparatus 2 shown is a double unit, with two opposed, mirror-image stationary support frames 3a,3b joined by a gantry 4. The gantry 4 provides two cat-walks 5,6, and supports a conical pouring guide 7.

Each support frame 3a,3b comprises two spaced, parallel sides 8,9, (only one of which is visible on each frame), a front 10,11, and a base 12,13. The sides, front and base of each frame 3a,3b, are constructed as open frameworks made from spaced girders and cross-braces; for clarity, these are shown only diagrammatically in the drawings, and it will be appreciated that the support frames may be made heavier or lighter, as required for the weight of the receptacle to be supported.

The lower ends of the girders forming the uprights of the sides 8,9, and fronts 10,11, of the support frames extend below the corresponding bases 12,13, to form feet 16,17, upon which the support frames rest upon the ground or other supporting surface. The feet 16,17, may be adjustable to allow for uneven ground.

The upper edge of each side 8,9, is formed by an inclined brace 14,15, the lower end of which provides a pivotal anchorage for one end of an hydraulic ram 18,19.

The other end of each ram 18,19, is pivotally secured to a collar 20,21, which partly encircles a circular cross-section receptacle 22,23, associated with the support frame 3a,3b, respectively.

Each collar 20,21, is rigidly secured to the corresponding receptacle 22,23. At each side of the receptacle, the collar projects forwards, i.e. beyond the front of the support frame, and is pivoted to the corresponding side of the gantry 4 at pivots 20a,21a.

Each receptacle 22,23, is substantially cylindrical, but with a tapered upper portion 24,25, terminating in a top opening 26,27, through which the contents of the receptacle may be poured when the receptacle is inclined, as hereinafter described. This top opening 26,27, may be closed by a removable lid (not shown).

Each receptacle and its associated support frame are dimensioned so that the receptacle can be pivoted in and out of the stationary frame, pivoting between the lowered position L of Fig. 1 and the raised position R of Fig. 1. In the lowered position, each receptacle 22,23, hangs above the corresponding base 12,13, supported from the collar 20,21. This keeps the bottom of the receptacle clean and also prevents it from catching or binding on the base 12,13.

Each collar 20,21, encircles the corresponding receptacle 22,23, just below the tapered upper portion 24,25. Each collar may be permanently secured to the receptacle (e.g. by welding) or may be releasably secured to the receptacle. The pair of hydraulic rams 18,19, are secured one to each side of the collar, near the front of the corresponding support frame, such that when the pair of rams 18 is extended as shown on the left-hand side of Fig.1, the receptacle is raised and pivoted in the direction of arrow A, until it reaches the raised, partially-inverted position R. In this position, the top opening 26 is above the pouring guide 7, so that the contents of the receptacle can pour out of the opening 26 to be collected by the guide 7.

Since the receptacle is raised and pivoted by a pair of hydraulic rams, the movement of the receptacle is completely controllable – the receptacle can be raised and/or pivoted slowly or rapidly, as required. Further, pouring can be halted at any point:- it is not necessary to empty the receptacle in a single pouring.

All pouring operations can be fully supervised by a controller standing on the cat-walk 5/6. The controller can control the rams directly, by a remote control, or can communicate with a second person controlling the rams.

The pouring guide 7 is located beneath a corresponding aperture (not visible) in the gantry 4. The guide 7 can direct the contents of the receptacle into any required container located beneath the guide. Fig. 1 diagrammatically represents a membrane press 27 beneath the guide 7, but it will be appreciated that the membrane press could be replaced by any desired type of container/further processing apparatus.

The above described apparatus is used as follows – each of the receptacles 22,23 is filled with any desired grape material, (e.g. fruit, pulp, juice, pre-drained skins or fortifying beverage) with the containers 22,23 in the lowered position L. The receptacles are filled through the top openings 26,27. The receptacles may be fitted with internal screens or filters (not shown) so that if the receptacles are filled with material which is a mixture of liquid and solid (e.g. pulp) the liquid drains through to the bottom of the receptacle and can be removed from the receptacle by pumping out through a lower aperture (not shown) in the receptacle, if desired.

If the receptacle is fitted with a removable collar 20,21, then the receptacle may be filled with the material either before or after positioning in the support frame.

When it is desired to remove some or all of the material from one of the receptacles 22, a container or further processing apparatus (e.g. a membrane press 27) is positioned below the pouring guide 7, and the upper hatch of the membrane press opened to receive material poured through the guide 7. The lid of the receptacle 22 is removed, and the operator controls the supply of hydraulic fluid to the pair of rams 18 to gradually extend the rams and slowly raise and tilt the receptacle 22, so that material pours from the open top 26 of the container 22 into the guide 7 and hence into the membrane press 27. The pouring operation may be supervised and/or controlled by a person standing on the catwalk 6. When the desired amount of material has been poured out of the receptacle, the receptacle 22 is lowered back to position L by contracting the pair of rams 18. It would be appreciated that the raising and tipping of the receptacle 22 may be as slow and as gentle as necessary. If the contents of the receptacle 22 tend to stick inside the receptacle, the receptacle can be rocked backwards and forwards by alternation of the hydraulic rams 18 in reverse and forward drive to remove any material that may adhere to the base and sides of the receptacle walls.

Throughout the lifting and lowering of the receptacle 22, the apparatus is stabilised by the receptacle 23 in the lowered position, and its associated support frame. For additional stability, the feet 16,17 may be secured to the ground/floor.

The receptacle 23 is emptied in the same manner as described above in respect of the receptacle 22.

Fig. 2 shows a pair of double units similar, but not identical, to those of Fig. 1. The same components are given the same reference numerals. In the Fig. 2 embodiment, the girders 8a,9a forming the outer edges of the sides 8,9, are angled inwards, so that the diagonal braces 14,15 are somewhat shorter than in the Fig. 1 embodiment. Further, the lower ends of the pairs of hydraulic rams 18,19 are mounted on brackets 14a,15a, secured to the braces 14,15, rather than directly to the braces.

The right-hand side of Fig. 2 shows the receptacle 23 as a four-position 'development'

between the fully-lowered position L and the fully-raised position R.

In the second embodiment shown in Fig. 3, the apparatus is a single unit only; all the parts of the apparatus which are the same as described above with reference to Figs. 1 and 2 are identified by the same numerals. In the Fig. 3 embodiment, there is only a single receptacle 22 with its associated support frame 3a. In order to stabilise the apparatus when the receptacle 22 is moved to the raised position R as shown in Fig. 3, the end of the gantry 4 furthest from the support frame 3a is secured to a wall 30. Alternatively, one or more supporting legs may be substituted for the wall 30.

The third embodiment shown in Fig. 4 also is a single unit and, as in Fig. 3, the same reference numerals as in Fig. 1 are used for identical components. In the Fig. 4 embodiment, the receptacle 22 in the raised position R is stabilised by increasing the width of the parallel sides 8 of the support frame 3a, so that the front legs 31 of the support frame lie beneath the point of balance of the receptacle 22 in the raised position R.

The receptacles and the associated support frames may be made of any suitable material. For use with organic materials such as grape products, stainless steel receptacles are preferred.

Typical dimensions and capacities are:

receptacle capacity	-	10 tonnes
diameter of receptacle base	-	2710 cm.
length of each side 8	-	1950 cm.
height of support frame	-	3000 cm.
height of top of receptacle above ground in position L	-	3640 cm.
height of base of receptacle above ground in position R	-	6950.54 cm
overall width of support frame and receptacles	-	8140 cm

It will be appreciated that pneumatic rams could be substituted for hydraulic rams 18,19, for appropriate applications where the weight of the receptacle plus load is relatively light.